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and NATIONAL SCIENCE FOUNDATION

UNITED STATES DISTRICT COURT

DISTRICT OF HAWAII

LUIS SANCHO, WALTER L. WAGNER,)	Civil No. 08-00136-HG-KSC
)	
Plaintiffs,)	FEDERAL DEFENDANTS'
)	DECLARATION OF
)	MORRIS PRIPSTEIN
v.)	
)	
UNITED STATES DEPARTMENT OF)	
ENERGY, <i>et al.</i> ,)	
)	
Defendants.)	
)	

I, Morris Pripstein, hereby declare as follows:

1. I currently serve as the National Science Foundation (“NSF”) Program Manager for the U.S. Large Hadron Collider (“LHC”) Program. In that capacity, I regularly communicate with my counterpart at the U.S. Department of Energy (“DOE”) Office of High Energy Physics in Germantown, Maryland. Prior to becoming the NSF Program Manager for the LHC Program in 2005, I was the DOE Program Manager for the LHC Program at the DOE Office of High Energy Physics in Germantown, Maryland from 2002 through 2004.

2. I hold a Bachelor’s Degree in Engineering Physics from McGill University in Montreal, Canada, and a Ph.D. in High-Energy Physics (also known as “elementary particle physics”) from the University of California in Berkeley, California.

3. I have more than 40 years of research experience as an experimental elementary particle physicist at the University of California’s Lawrence Berkeley National Laboratory (“LBNL”) in Berkeley, California. Specifically, from 1994 until 2002, I was the Head of the BaBar Physics Group at LBNL, and from 1967 until 2005, I served as a Senior Staff Physicist at LBNL. In addition, from 1967 through 1994, I was a Member of Physics Group A at LBNL, and between 1973 and 1976, I was the Head of Physics Group A at LBNL, which was the largest experimental elementary particle physics group in the United States, and one of the

largest in the world at that time. From 1986 until 1987, I served as an IN2P3-LBNL Exchange Fellow at the *Laboratoire d'Annecy-le-Vieux de Physique des Particules* ("LAPP") in Annecy, France, and at the European Organization for Nuclear Research ("CERN") in Geneva, Switzerland.

4. I have had more than 350 professional papers published, and, since 1991, I have been a Fellow of the American Physical Society, which is a distinction granted only to approximately 13% of the Society's membership. For a full report on my educational and professional history, please see my curriculum vitae, attached hereto as "Exhibit A."

5. In my capacity as NSF Program Manager for the LHC Program, and as a result of my prior work experience, I have become aware of the purpose, design, construction, safety risks, and schedule for the LHC. I also have personal knowledge of NSF's contributions of federal funds for both the construction and proposed operation of the LHC's particle detectors.

6. The information contained in this declaration is based upon my personal knowledge and information obtained in the course of my official responsibilities as NSF Program Manager for the LHC Program.

7. I am aware that, in early 1999, NSF made a decision to contribute a total of \$81 million in federal funds toward the construction of two large detectors, the "ATLAS" and the "CMS" detectors to be used at the LHC. The ATLAS

detector is the largest-volume particle physics detector ever built and construction of it has been completed. The CMS detector, which has also been fully constructed, is, as is the ATLAS detector, designed to discover new physics at the energy frontier. Both the ATLAS and CMS detectors are currently located in Geneva, Switzerland, and are under the control of CERN.

8. The scientific goals of both the ATLAS and CMS detectors are to address the most basic and compelling questions of 21st century physics, including:

a) What is the origin of mass? In other words, why do we have mass and why do different types of particles have different mass?

b) Do extra dimensions exist beyond space and time?

c) What is the dark matter?

d) How can we solve the mystery of dark energy? and

e) How did the universe come to be?

9. NSF's decision to contribute a total of \$81 million in federal funds for the construction of both the CMS and ATLAS detectors is set forth in two cooperative agreements, which are described as follows:

(a) Cooperative Agreement No. PHY 9722537 between NSF and Columbia University (attached hereto as "Exhibit B") became effective on January 1, 1999. It provides that NSF would contribute a total of \$60,800,000 to Columbia

University for the purpose of managing the NSF funding allocated to the U.S. institutions collaborating on the design and fabrication of the ATLAS components. See Exhibit B at section II.A., page 2, and section VI., pages 4-5. All funds authorized under this Cooperative Agreement have been disbursed by the end of FY2003 and spent by the end of FY2006.

(b) Cooperative Agreement No. PHY 9722562 between NSF and Northeastern University (attached hereto as "Exhibit C"), became effective on March 1, 1999. It provides that NSF would contribute a total of \$20,200,000 to Northeastern University for the purpose of managing the NSF finding allocated to the U.S. institutions collaborating on the design and fabrication of CMS components. See Exhibit C at section II.A., page 2, and section VI., pages 4-5. All funds authorized under this Cooperative Agreement have been disbursed by the end of FY2003 and spent by February 1, 2007.

10. Between FY2003 and FY2006, NSF provided a total of approximately \$36 million in federal funds — all of which were disbursed by the end of FY2006 and spent prior to September 30, 2007 — related to testing and otherwise preparing the CMS and ATLAS detectors for operation. In 2007, NSF then made a decision to contribute a total of \$87 million in federal funds for the operation and maintenance of both the CMS and ATLAS detectors. This decision is set forth in two cooperative agreements, which are described as follows:

(a) Cooperative Agreement No. PHY-0612805 between NSF and the University of California, Los Angeles (attached hereto as “Exhibit D”), has an effective date of January 1, 2007. It provides that, subject to available funds, NSF will contribute a total of \$42,000,000 over a period of five years to the University of California, Los Angeles, for the purpose of managing the NSF funding allocated to the U.S. institutions collaborating on the operation and maintenance of the CMS detector. *See Exhibit D at page 3.*

(b) Cooperative Agreement No. PHY-0612811 between NSF and Columbia University (attached hereto as “Exhibit E”), has an effective date of February 1, 2007. It provides that, subject to available funds, NSF will contribute a total of \$45,000,000 over a period of 5 years to Columbia University for the purpose of managing the NSF funding allocated to the U.S. institutions collaborating on the operation and maintenance of the operation and maintenance of the ATLAS detector. *See Exhibit E at page 3.*

11. The scientists who are funded by NSF (approximately 200) and the DOE (collectively referred to herein as “the U.S. scientists”) work with other scientists from around the world who contribute toward the maintenance and operation of the CMS and ATLAS detectors. The U.S. scientists comprise 20% of the total ATLAS collaboration and 34% of the CMS collaboration. Thus, if the U.S. scientists were prohibited from working with the rest of the collaborations, the

remaining scientists on the team would be able to carry out the steps necessary to competently maintain and operate both detectors. If this occurred, however, there would be a significant lost research opportunity for the United States to competitively participate in cutting-edge research in the field of high-energy physics.

12. As NSF Program Manager for the LHC Program, and as an experienced High-Energy Physicist, I am familiar with the safety reports relevant to the alleged risks set forth in the above-captioned Complaint and supporting declarations, all of which I have reviewed. Specifically, the “Review of Speculative ‘Disaster Scenarios’ at RHIC,” by W. Busza, *et al.*, was submitted to DOE’s Brookhaven National Laboratory (“BNL”) in Upton, New York, and made public on September 28, 1999 (the “RHIC study”). (The RHIC study also was published in the professional journal, *Reviews of Modern Physics* in the year 2000.) This expert safety report for the Relativistic Heavy Ion Collider (“RHIC”) concluded that the same potential catastrophic scenarios alleged by the Plaintiffs in this lawsuit and their declarants (i.e., the “doomsday” result from the production of mini-black holes and strangelets) were “firmly excluded by existing empirical evidence, compelling theoretical arguments, or both.” Moreover, the RHIC has been operating since the year 2000 with none of the alleged catastrophic scenarios that Plaintiffs and their declarants claim will happen with the LHC.

13. I am also aware of the expert safety report published in February 2003, by CERN's LHC Safety Study Group that addressed the possibility of producing dangerous objects during heavy-ion collisions at the LHC. The report, entitled, "Study of Potentially Dangerous Events During Heavy-Ion Collisions at the LHC: Report of the LHC Safety Study Group," by J.-P. Blaizot, *et al.*, published on February 28, 2003, concluded that, "[w]e find no basis for any conceivable threat [from such objects as mini-black holes, magnetic monopoles, and strangelets]." I understand that CERN is now in the process of updating its 2003 expert safety report, which is now being peer-reviewed, and is expected to be released within the next two months.

14. I have reviewed all of the affidavits filed to date in support of Plaintiffs' lawsuit in the above-captioned matter and, in my professional experience as a high-energy physicist, I do not believe that the allegations contained in their affidavits are scientifically supportable. To rule out the possibility that major environmental disasters will occur, the recognized scientific professional community relies on: a) solid, unimpeachable theoretical arguments, such as physical conservation laws and properties of well-known interactions (e.g., electromagnetic interactions); and b) empirical evidence by analyzing the effects of phenomena in other contexts (i.e., other high-energy physics experiments,

astrophysics, and cosmology) to exclude possible catastrophic occurrences at the LHC.

15. Applying the principles and methodology set forth in paragraph 14, above, the alleged catastrophic results from the operation of the LHC claimed by Plaintiffs lack merit. For example, affiant Walter Wagner states in paragraph 2 of his affidavit that he is credited with discovering magnetic monopoles. If true, then our continued existence contradicts the Plaintiffs' allegations in their Complaint about the dangers of such objects.

16. Moreover, the 1975 study conducted at the University of California at Berkeley that originally claimed to have discovered magnetic monopoles was later disputed by the scientific community. To date, there has been no corroborated research that reveals the existence of magnetic monopoles. The 2003 expert safety report for the LHC concluded that, even if magnetic monopoles were produced as a result of operation of the LHC, the result would amount to insignificant destruction of ordinary matter, the weight of which would be less than that of even one strand of human hair. No peer-reviewed scientific research has challenged this finding. Further, no such destruction has resulted from naturally occurring events such as cosmic rays colliding with the Earth and other celestial bodies such as the moon and other planets. Thus, even if magnetic monopoles were discovered during the course of the LHC experiments, there is no scientific basis for concluding that they

would result in the catastrophic scenario alleged by the Plaintiffs in their Complaint and supporting affidavits.

17. Walter Wagner also raises concerns in paragraph 22 of his affidavit about the LHC's potential creation of micro-black holes. In my professional opinion, which is consistent with the position of the recognized scientific professional community on this issue, these concerns are unfounded. Black holes are created in the Universe by the collapse of massive stars containing enormous amounts of gravitational energy, which pulls in the surrounding matter; the gravitational pull of a black hole is related to the amount of matter or energy contained in it. Thus, the lower the amount of mass and energy contained in a black hole, the weaker is its gravitational pull.

18. For the reasons described in paragraph 17, above, if micro-black holes are produced at the LHC, they would be the result of collisions at much lower energy than what can occur in nature; thus, the mass of any micro-black holes produced at the LHC – if that indeed occurs – would be so microscopic that they would not have a strong enough gravitational force to pull in surrounding matter, and they would evaporate soon after their creation. Another way to look at this issue is by considering the significant cosmic radiation that occurs on a daily basis as a result of cosmic rays striking the Earth. These high-energy producing cosmic rays have been striking the Earth for billions of years with no catastrophic results.

Therefore, consistent with what was concluded in both the 2003 expert safety report and the RHIC study in 1999/2000, there is no scientific basis for concluding that the far-less energy producing collisions occurring inside the LHC would result in catastrophically dangerous black holes.

19. Plaintiffs' affiants also allege that operation of the LHC will result in the creation of "strangelets." Strangelets, however, are hypothetical forms of matter that have never been proven to exist. If they did exist, they would be comprised of "strange quarks" in addition to "up and down quarks," which exist in ordinary, stable matter. Moreover, if they did exist, the safety reports mentioned earlier show that there would not be harmful consequences. Further, if such strangelets would be produced at the LHC accelerator, they would likely have already occurred at the RHIC accelerator, and none have been seen. In addition, data from naturally occurring cosmic rays shows no evidence of the effects of such hypothetical particles.

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20. In sum, there is no empirical evidence --- either from high-energy cosmic ray interactions or from previous accelerator studies --- that support Plaintiffs' allegations of hypothetical harm in their Complaint or supporting affidavits. In addition, there has not been any refutation in recognized peer-reviewed professional journals of the findings set forth in the RHIC study or the 2003 expert safety study.

Pursuant to 28 U.S.C. §1746, I, Morris Pripstein, hereby declare, under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Executed on this 12th day of June, 2008, by:

A handwritten signature in cursive script, reading "Morris Pripstein".

Morris Pripstein
National Science Foundation
Program Manager for the Large Hadron Collider

CERTIFICATE OF SERVICE

I hereby certify that, on June 24, 2008, by the methods of service noted below, a true and correct copy of the foregoing FEDERAL DEFENDANTS' DECLARATION OF MORRIS PRIPSTEIN and attachments thereto were served on the following at their last known addresses:

Served by first-class United States mail, postage prepaid:

LUIS SANCHO
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WALTER L. WAGNER
P.O. Box 881
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Dated: June 24, 2008

/s/ Brian C. Toth
BRIAN C. TOTH
Trial Attorney
Natural Resources Section
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Attorneys for Defendants
U.S. Department of Energy,
National Science Foundation, and
Fermilab